



Maintaining & Optimizing Energy Efficiency in Automotive Test Labs

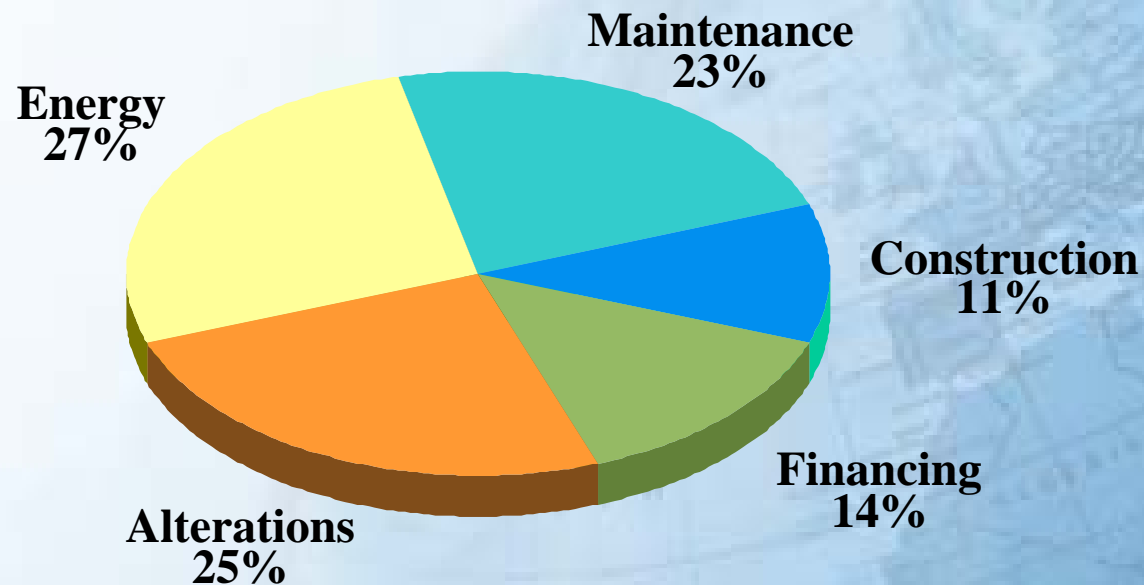
JOHNSON
CONTROLS

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Agenda

- Life Cycle Cost Analysis & Operational Cost Impact
- Developing Energy Efficient Operations & Maintenance Strategies
 - Process
 - Maintenance Perspective
 - Energy Perspective
- Summary

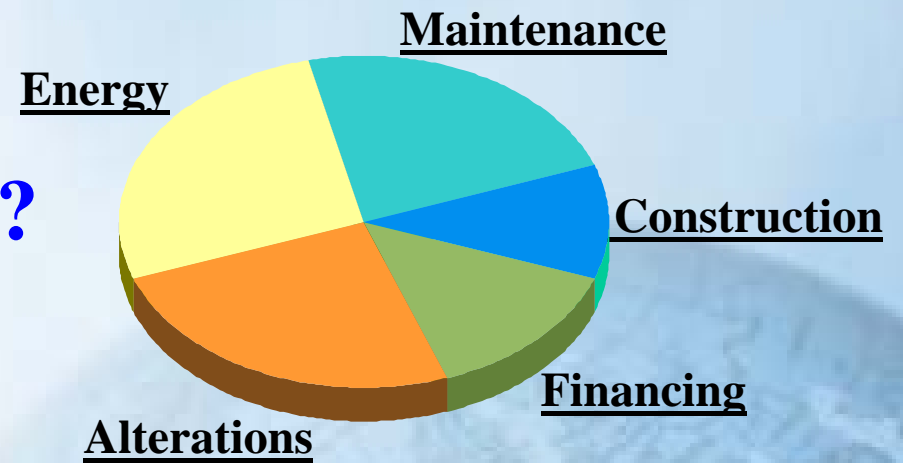
40 Year Life Cycle Costs - Typical Facility ASHRAE



The typical focus on reducing initial cost of construction and deferring maintenance ultimately causes building owners to pay too much for a lower quality facility environment in the long run.

What about Test Cells?

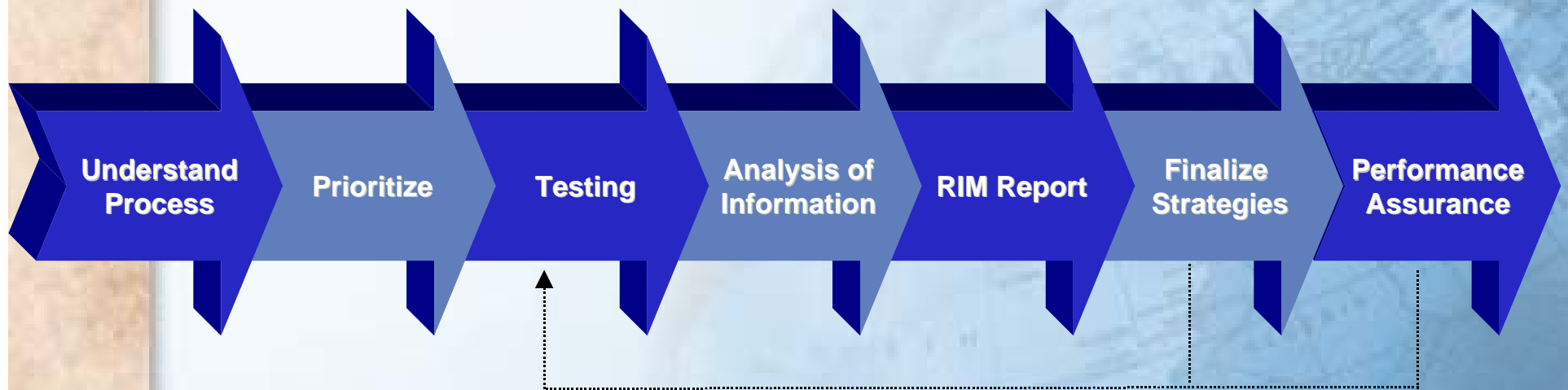
- CONSTRUCTION
- FINANCING
- ALTERATIONS
- MAINTENANCE
- ENERGY



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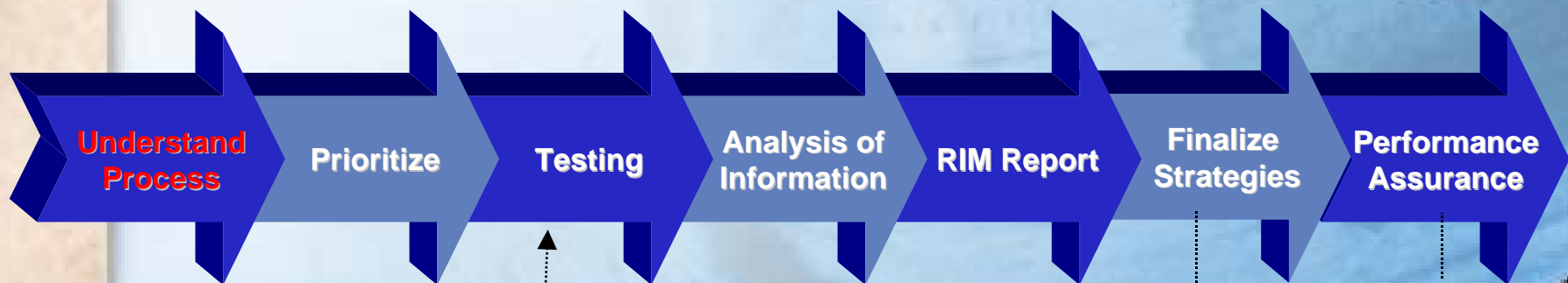


Developing Efficient Maintenance Strategies



Understand the Process

- What Function does the Facility Serve?
- What is the current project at hand?
- What is the current operational status?
- What equipment, technology, and personnel is available?



Prioritize Areas & Equipment - Maintenance Considerations

Priority

High

Med

Low

Downtime Risk

Mission Critical Area

Mission Critical Area

Not Mission Critical Area

System Redundancy

No Redundancy

Prorated Redundancy

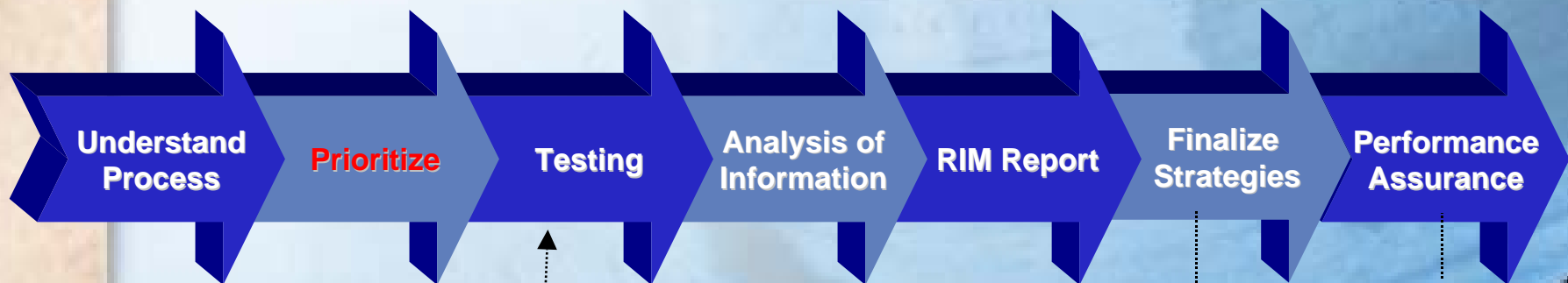
Total Redundancy

Repair Risk

High Secondary Damage

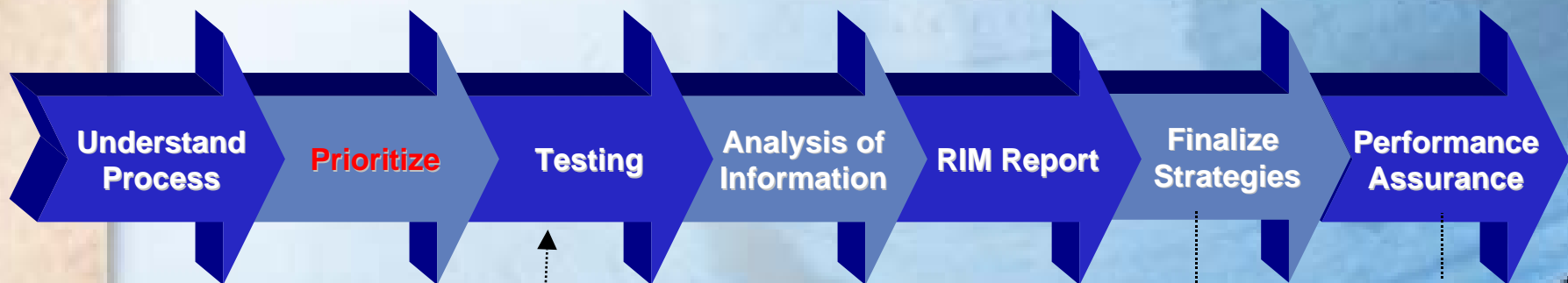
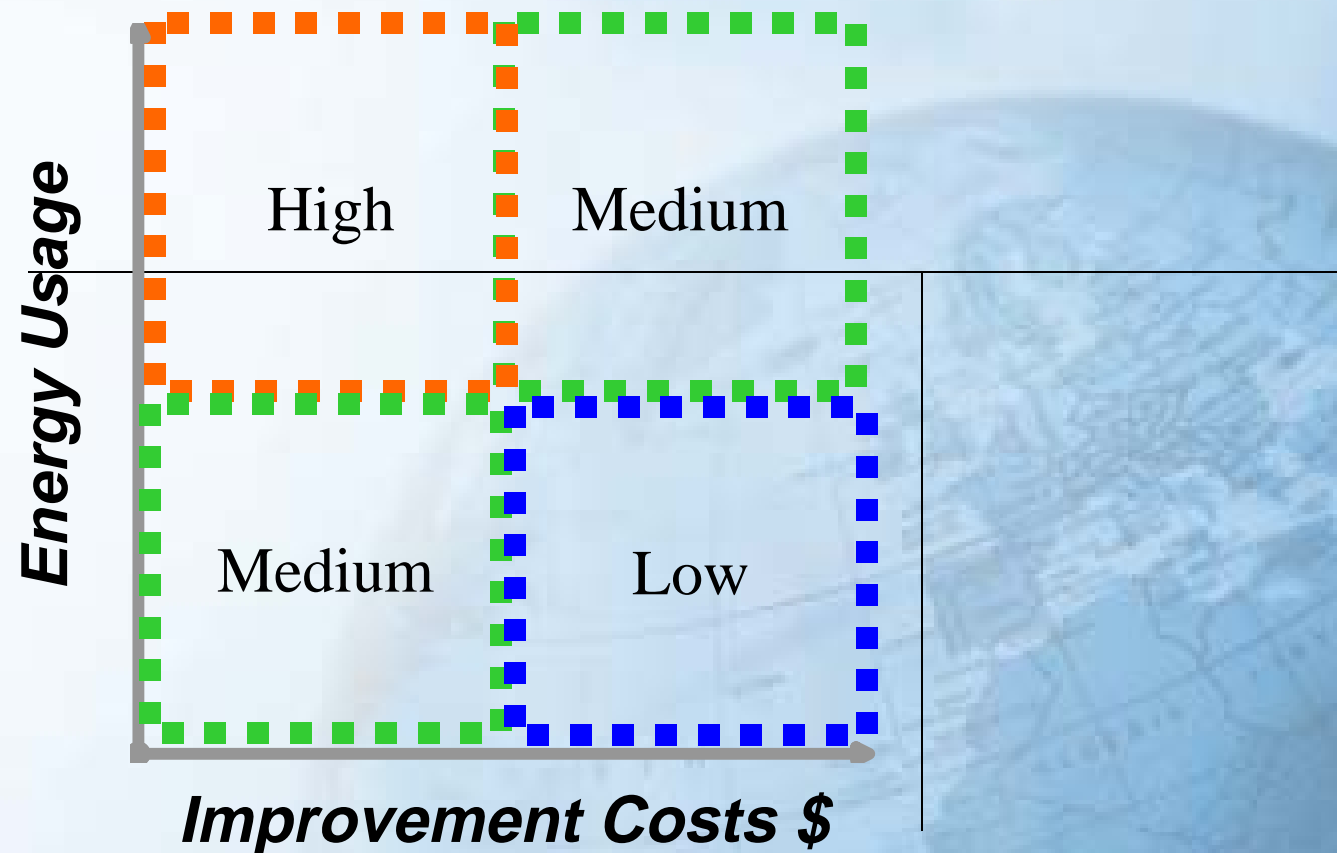
Medium Secondary Damage

Low Secondary Damage





Prioritize Areas & Equipment - Energy Efficiency Considerations

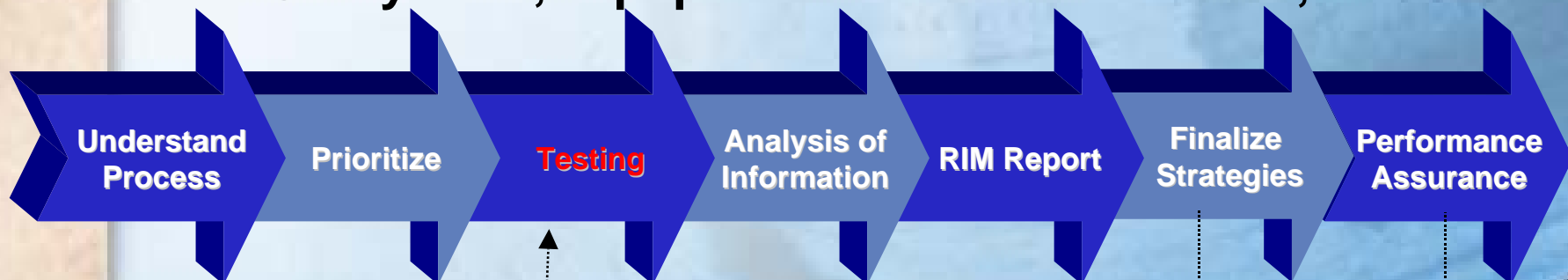


Testing - Maintenance

- Vibration Signatures
- Infrared Thermal Imaging (IR)
- Fluid Sampling (compressor oil, hydraulic oil)
- Motor Current

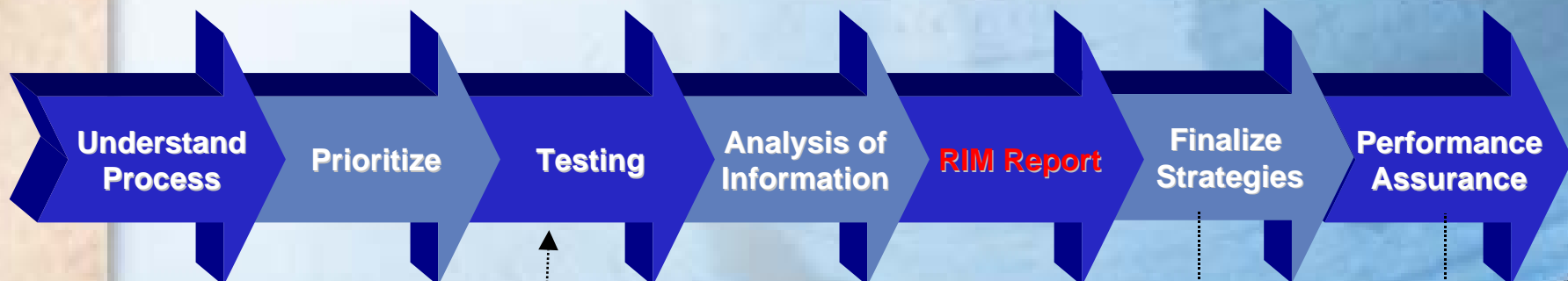
Testing - Energy Efficiency

- Trending
- Data Collection
 - Utility Bills, Equipment Manufacturer Data, etc.



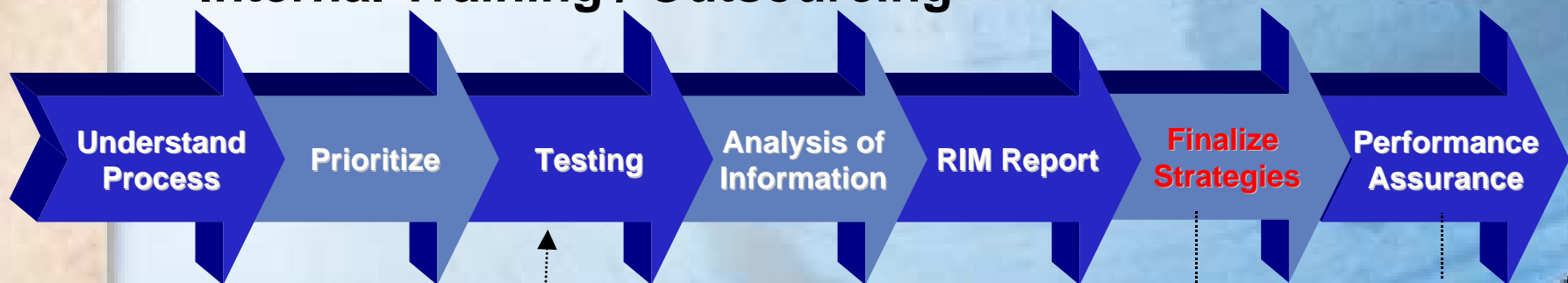
RIM Report (Reliability Improvement Measures)

- Assessment of Existing Conditions
- Detailed Scope of Repairs and Recommendations
- Risk Assessments
- Suggested Enhancements/Upgrades
- Budget Costs (capital, expense)

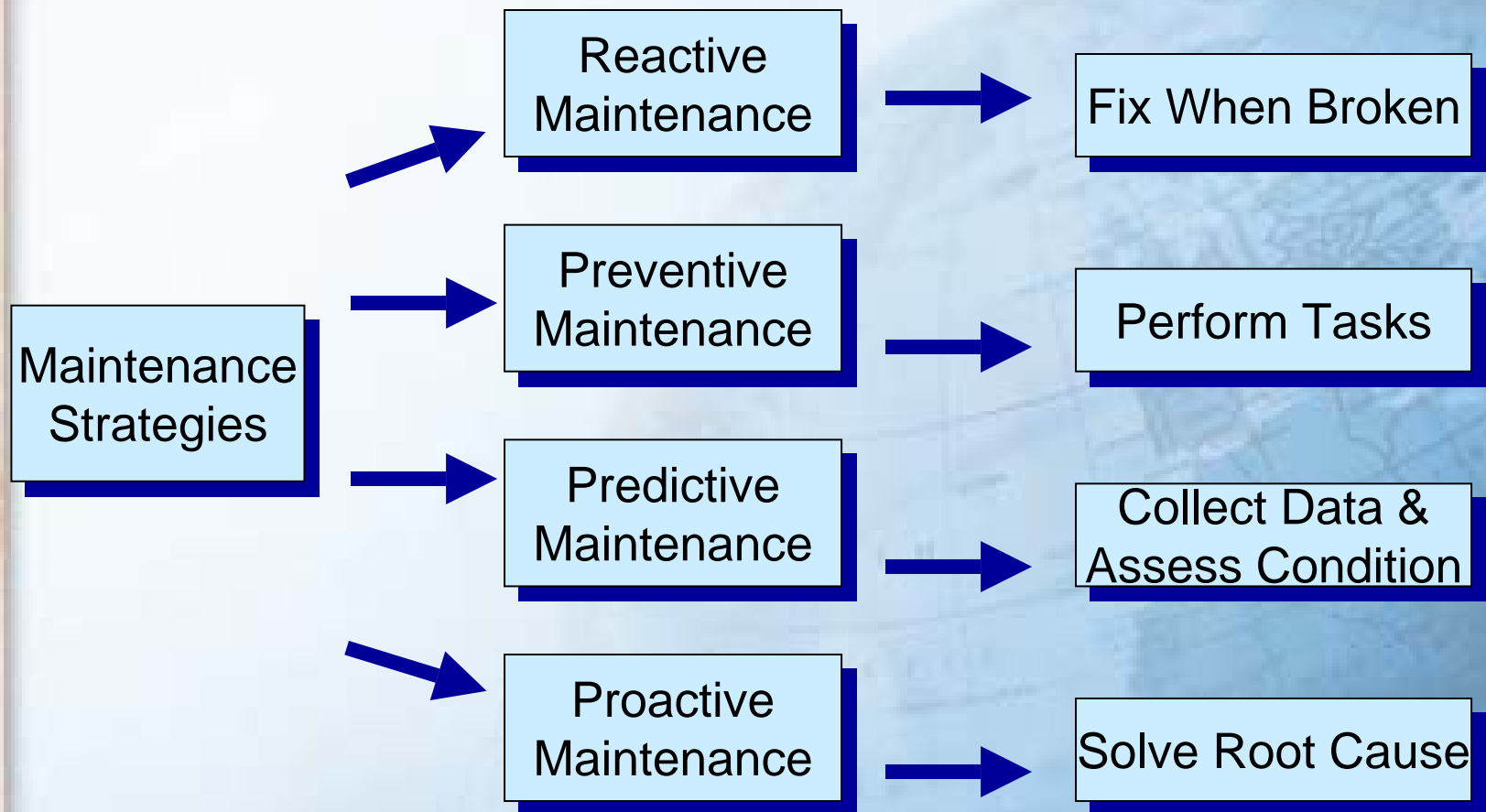


Finalize Strategies

- Match Areas & Equipment to Maintenance Level
 - Reactive
 - Preventive
 - Predictive/Proactive
- Add Appropriate Monitoring & Automation Technology
 - Based on Payback
- Develop Automated Schedules Based on Usage Trends
- Develop a Schedule for Frequency of Testing
- Evaluate Financial Justification
- Internal Training / Outsourcing



Maintenance Strategies





Example:

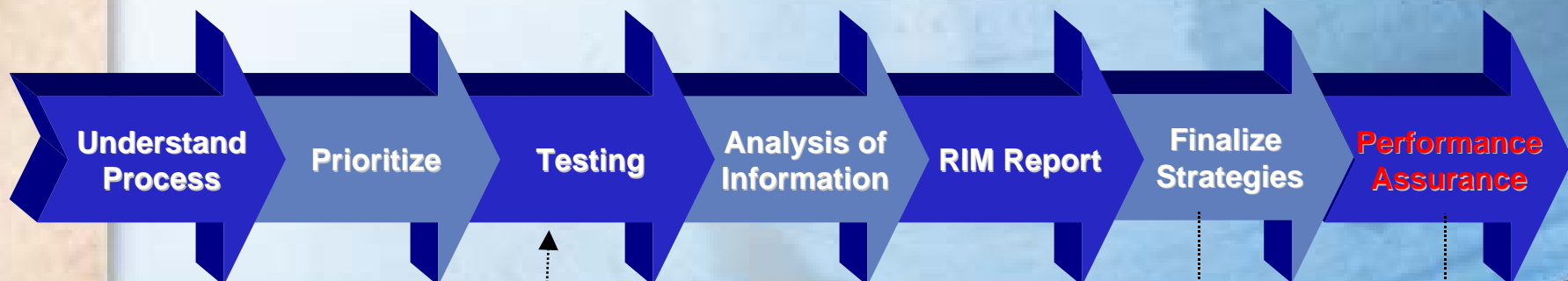
HVAC Predictive Maintenance

Analysis	Detects	Cost Avoidance ++
Vibration	Mechanical Problems	\$20-40,000 Secondary Damage
Oil	Oil Condition & Component Wear	\$10,000 Premature Bearing Replacement
Motor Current	Motor Rotor	\$2-6,000 Growler Test
Meggar	Motor Insulation	\$10-20,000 Motor Burnt Out
Eddy Current Tuby	Condenser & Evaporator Tubes	\$24,000 Secondary Damage

++ Plus Downtime (often more than damage costs)

Performance Assurance

- Assign an Energy “Watch Dog”
- Monitor and Track Results
 - Make Necessary Adjustments
 - Identify Additional Energy Savings
- In-House vs. Outsourcing
 - Guaranteed Savings \$\$\$
 - JCI has over 700 contracts worth over \$2 Billion
 - JCI has less than 1% shortfall



Benefits of Efficient O&M

- **Reduces unscheduled downtime**
- **Reduces maintenance & operations costs**
 - **ENERGY COSTS**
 - **Emergencies, scheduled teardowns, secondary damage**
 - **Workload reduction (PM's), reactive maintenance**
- **Cost effective retrofit decisions**
- **Extends asset (equipment) life**
- **Optimal Equipment Operation = Energy Efficient**



“Maintaining & Optimizing Energy Efficiency in Automotive Test Labs”

***THANK YOU !
HAVE A GREAT CONFERENCE***

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